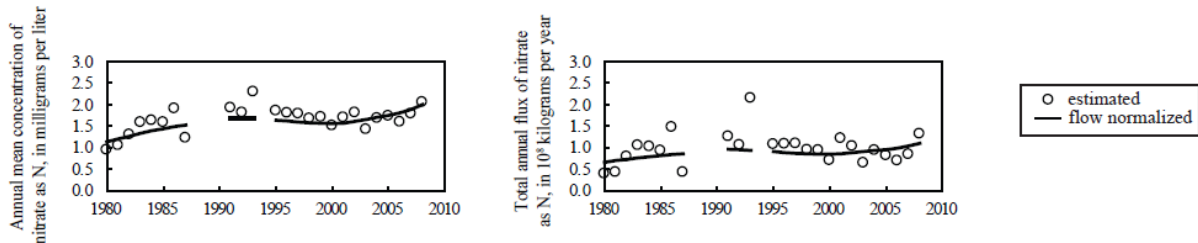


Mississippi River at Clinton, IA

Flow-normalized nitrate concentration and flux

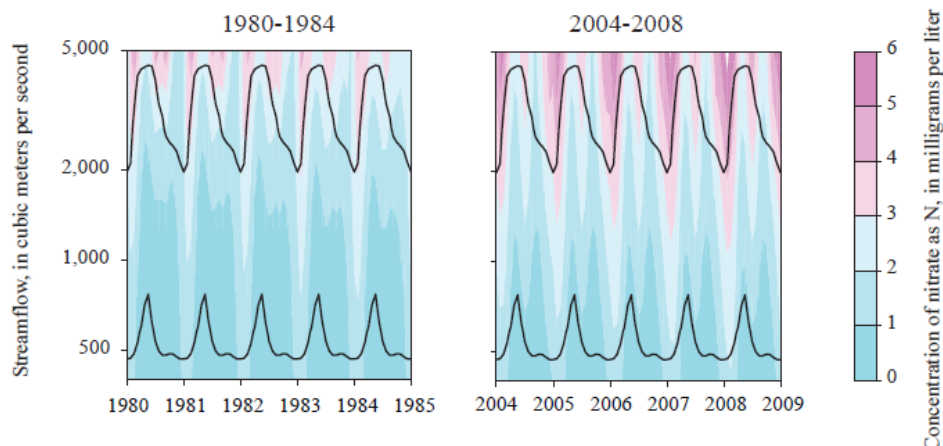
Among the eight study sites, the largest percentage increases in flow-normalized nitrate concentration and flux between 1980 and 2008 occurred at Mississippi River at Clinton, IA. These increases (76 and 67%, respectively) were over three times larger than at any other site except Missouri River at Hermann, MO. Notably, this site was among those with the lowest flow-normalized concentration and yield (flux per unit area) in 1980. Flow-normalized concentration and flux increased during the 1980s, were relatively stable in the 1990s, and then increased after 2000.



EXPLANATION: Estimated concentration and flux are strongly influenced by changes in climate and streamflow. For example, concentration and flux of nitrate are different during floods than during droughts. Flow-normalized concentration and flux are independent of changes in streamflow, so they can provide greater insight into the effects of conservation practices and other changes in the watershed.

Comparison of nitrate concentrations over time and with streamflow

Nitrate concentrations at Mississippi River at Clinton increased between the early 1980s and mid 2000s at all streamflows. These increases were largest at high and moderate streamflows.



EXPLANATION: These contour plots show model estimates of concentration as a function of time and streamflow for two 5-year snapshots in time—an early period from 1980 to 1984 and a recent period from 2004 to 2008. Any vertical line shows how concentration would have varied with streamflow on a particular day of a particular year; any horizontal line shows how concentration would have varied over time (seasonally and annually) at a particular streamflow. Because the probability distribution of streamflow changes from day to day, smoothed estimates of the 5th and 95th percentiles of streamflow on each day are plotted as black lines.

Map of sampling location:

http://nwis.waterdata.usgs.gov/ia/nwis/nwismap/?site_no=05420500&agency_cd=USGS

Link to water-quality data:

http://infotrek.er.usgs.gov/nasqan_query